

Four new species and one newly-recorded species of the genus *Opopaea* Simon, 1892 (Araneae, Oonopidae) from southern China, with a key to Chinese species

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Abstract

Five species of the genus *Opopaea* Simon, 1892 from southern China are recognised, including four new species: *Opopaea mangun* Tong & Li, **sp. nov.**, *Opopaea taibao* Tong & Yang, **sp. nov.**, *Opopaea wenshan* Tong & Zhang, **sp. nov.** and *Opopaea yuhuang* Tong & Li, **sp. nov.** from Yunnan and one newly-recorded species: *Opopaea foveolata* Roewer, 1963 from Hainan. Detailed diagnoses, descriptions and photomicroscopy images of new species are provided, based on specimens of both sexes. A key to species of the genus *Opopaea* from China is provided.

Key Words

biodiversity, goblin spiders, Hainan, Yunnan, taxonomy

Introduction

Goblin spiders (Araneae, Oonopidae) are small (usually < 3 mm), six-eyed, haplogyne, non-web building spiders distributed worldwide and are especially diverse in tropical regions. They occupy diverse habitats and mainly occur in leaf litter, under bark and in the tree canopy (Henrard and Jocqué 2012; Ranasinghe and Benjamin 2018). Oonopidae is amongst the nine most diverse spider families with 1940 extant described species in 115 genera (WSC 2024).

The goblin spider genus *Opopaea* Simon, 1892 is a widespread and highly diverse genus, with biodiversity hotspots in Africa, Asia and Australia (Baehr et al. 2013). A total of 187 valid extant species are currently known, in which 46 in Africa, 35 in Asia, 96 in Australia and New Caledonia and 10 in other areas (WSC 2024). *Opopaea* are small to medium-sized oonopids, ranging from 1.0 to 2.4 mm in body length, with the abdomen completely covered with ventral and dorsal scuta (Tong and Li 2015). Species of *Opopaea* have the male palpal patella greatly swollen, connected to the femur medially

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and the cymbium and bulb are completely fused. The genus *Opopaea* can be easily distinguished from the other genera by the absence of legs spines, by the completely fused cymbium and bulb and by the presence of dorso-lateral, triangular extensions on pedicel, as well as paired scutal ridges on the scuto-pedicel region (Andriamalala and Hormiga 2013; Baehr et al. 2013).

The *Opopaea* fauna of China is poorly known, with only 18 described species, of which one species (*O. media* Song & Xu, 1984) is from Anhui and Zhejiang; one species (*O. plumula* Yin & Wang, 1984) from Hunan; one species (*O. sauteri* Brignoli, 1974) from Taiwan; two pantropical species (*O. apicalis* (Simon, 1893), *O. deserticola* Simon, 1891) from Hainan and Taiwan; six species endemic to Hainan; six species endemic to Yunnan; and one species (*O. cornuta* Yin & Wang, 1984) widely distributed in southern China (Tong and Li 2010, 2014, 2015). Here, we recognise five species of the genus *Opopaea* from China, four of which are new to science.

Materials and methods

The specimens were examined using a Leica M205C stereomicroscope. Details of body parts and measurements were studied under an Olympus BX51 compound microscope. Photos were made with a Canon EOS 750D zoom digital camera (18 megapixels) mounted on an Olympus BX51 compound microscope. Endogynes were cleared in lactic acid. Scanning electron microscope images (SEM) were taken under high vacuum

with a Hitachi S-4800 after critical-point drying and gold-palladium coating. All measurements in the text are expressed in millimetres. All materials studied are deposited in Shenyang Normal University (SYNU) in Shenyang, China.

Terminology mainly follows Andriamalala and Hormiga (2013) and Tong et al. (2020). The following abbreviations are used in the text: AL = abdomen length; ALE = anterior lateral eyes; ALE-ALE = distance between ALEs; ALE-PLE = distance between ALE and PLE; AW = abdomen width; CBL = cymbiobulbus length; CBW = cymbiobulbus width; CL = carapace length; CW = carapace width; EGW = eye group width; FI = femur insertion on patella; FML = femur length; PLE = posterior lateral eyes; PME = posterior median eyes; PME-PME = distance between PMEs; PLE-PME = distance between PLE and PME; PTL = patella length; TL = total length. Used in the figures: ap = apodeme; asr = anterior scutal ridge; ass = arch-shaped sclerite; boc = booklung covers; dte = dorsolateral, triangular extensions; ga = globular appendix; na = nail-like process; nle = needle-like extension; pd = postgynal depression; pls = paddle-like sclerite; prr = prolateral ridge; psr = posterior scutal ridge; rds = round dark spot; rer = retrolateral ridge; sr = scutal ridge; trp = triangular protrusion; usr = upper scutal ridge.

Taxonomy

Family Oonopidae Simon, 1890
Genus *Opopaea* Simon, 1892

Key to *Opopaea* species from China

Males of *O. flabellata*, *O. semilunata* and females of *O. chunglinchaoi*, *O. sanya* and *O. sauteri* are unknown; *O. plumula* Yin & Wang, 1984 is not included because of insufficient information found in the original description.

- | | | |
|---|--|---|
| 1 | Male | 2 |
| – | Female | 21 |
| 2 | With a pair of posterolateral spikes on the dorsum of carapace (e.g. Tong and Li (2010): fig. 1A–D)..... | 3 |
| – | Without the aforementioned character | 6 |
| 3 | Clypeus height about 2.5 times ALE diameter (Tong and Li 2010: fig. 1B, K)..... | <i>O. cornuta</i> Yin & Wang, 1984 |
| – | Clypeus height less than 1.5 times ALE diameter | 4 |
| 4 | Booklung covers medium sized; distal part of palpal bulb with long medially bent outgrowth (Tong and Li 2010: figs 8A–C, E, 12A–F) | <i>O. vitripina</i> Tong & Li, 2010 |
| – | Booklung covers very small; distal part of palpal bulb without the aforementioned character | 5 |
| 5 | Abdomen with strongly elevated and blackened area between posterior spiracles (Tong and Li 2010: fig. 1H, I) | <i>O. diaoluoshan</i> Tong & Li, 2010 |
| – | Abdomen without the aforementioned character | <i>O. gibbifera</i> Tong & Li, 2008 |
| 6 | With dark spot at the posterior end of the abdominal dorsum (Platnick and Dupérré 2009: figs 105–110) | 7 |
| – | Without the aforementioned character | 8 |
| 7 | With basal protrusion on the palpal bulb (Platnick and Dupérré 2009: fig. 151) | <i>O. apicalis</i> Simon, 1893 |
| – | Without the aforementioned character (Lin et al. 2023: fig. 7A, B)..... | <i>O. chunglinchaoi</i> Barrion, Barrion-Dupo & Heong, 2013 |
| 8 | With nearly straight scutal ridge on scuto-pedicel region (e.g. Fig. 4H) | 9 |
| – | With nearly arch-shaped scutal ridge on scuto-pedicel region (e.g. Figs 7H, 10G, 13H) | 13 |

9	With a small apophysis in the retrolateral distal region of palpal bulb (Tong and Li 2010: fig. 5B; Tong and Li 2015: fig. 10B, E)	10
–	Without the aforementioned character	11
10	Posterior eye row procurved from above (Tong and Li 2010: fig. 5C).....	<i>O. sanya</i> Tong & Li, 2010
–	Posterior eye row straight from above (Tong and Li 2015: fig. 8D)	<i>O. rigidula</i> Tong & Li, 2015
11	Cymbiobulbus as long as the palpal patella (Fig. 6I, K)	<i>O. mangun</i> sp. nov.
–	Cymbiobulbus shorter than the palpal patella.....	12
12	Distal part of palp ear-shaped, with a small outgrowth (Tong and Li 2015: figs 1H, I, 3A–C)	<i>O. auriforma</i> Tong & Li, 2015
–	Distal part of palp round, without small outgrowth (Tong and Li 2015: figs 5I, J, 7A–C).....	<i>O. macula</i> Tong & Li, 2015
13	Clypeus height more than 2.0 times AME diameter	14
–	Clypeus height less than 1.5 times AME diameter.....	15
14	With one triangle protrusion and two largely folded ridges on palpal bulb (Fig. 12C, E).....	<i>O. wenshan</i> sp. nov.
–	Without the aforementioned character (Tong and Li 2010: figs 4A–C, 10A–H)	<i>O. furcula</i> Tong & Li, 2010
15	Palpal femur very small, about 1/4 length of patella.....	16
–	Palpal femur long, slightly shorter than half length of patella	17
16	Booklung covers large (Fig. 13C, H)	<i>O. yuhuang</i> sp. nov.
–	Booklung covers very small	<i>O. media</i> Song & Xu, 1984
17	Cymbiobulbus shorter than palpal patella.....	18
–	Cymbiobulbus longer than palpal patella	19
18	Bulb tip broad, with prolateral folded ridges (Fig. 9C)	<i>O. taibao</i> sp. nov.
–	Bulb tip gradually narrower, without prolateral folded ridges (Tong and Li 2015: fig. 15A, B)	<i>O. zhengi</i> Tong & Li, 2015
19	With a long prolateral ridges at distal third (Fig. 3B).....	20
–	Without the aforementioned character	<i>O. deserticola</i> Simon, 1892
20	Distal part of prolateral ridges of palp enlarged (Fig. 3B)	<i>O. foveolata</i> Roewer, 1963
–	Distal part of prolateral ridges of palp smoothly curved (Brignoli 1974: fig. 19)	<i>O. sauteri</i> Brignoli, 1974
21	With a pair of posterolateral spikes on the dorsum of carapace (e.g. Tong and Li (2010): fig. 1A–D).....	22
–	Without the aforementioned character	25
22	Epigastric region with a transparent, rather long, needle-like extension (Tong and Li 2010: fig. 8G)	<i>O. vitripina</i> Tong & Li, 2010
–	Without the aforementioned character	23
23	Epigastric region with a semicircular postgynal depression (Tong and Li 2010: fig. 2D)	<i>O. cornuta</i> Yin & Wang, 1984
–	Without the aforementioned character	24
24	Middle part of anterior scutal ridge small triangular shape (Tong and Li 2010: fig. 2G)	<i>O. gibbifera</i> Tong & Li, 2008
–	Middle part of anterior scutal ridge large triangular shape (Tong and Li 2010: fig. 3F) ...	<i>O. diaoluoshan</i> Tong & Li, 2010
25	With dark spot at the posterior end of the abdominal dorsum; epigastric region with an inverted V-shaped sclerotisation (Platnick and Dupérré 2009: figs 149, 150).....	<i>O. apicalis</i> Simon, 1893
–	Without the aforementioned character	26
26	With nearly straight scutal ridge on scuto-pedicel region (e.g. Fig. 4H)	27
–	With nearly arch-shaped scutal ridge on scuto-pedicel region (e.g. Figs 7H, 10G, 13H)	31
27	Epigastric region with a posterior scutal ridge (Tong and Li 2015: fig. 12E, K).....	<i>O. rigidula</i> Tong & Li, 2015
–	Without the aforementioned character	28
28	Epigastric region with a dark, chestnut-shaped spot and bean-shaped sclerotisation (Tong and Li 2015: figs 2G, H, 3D, E)	<i>O. auriforma</i> Tong & Li, 2015
–	Without the aforementioned character	29
29	Postgynal depression narrow and long (Tong and Li 2015: fig. 6J, K).....	<i>O. macula</i> Tong & Li, 2015
–	Without the aforementioned character	30
30	ALE separated by less than their radius (Fig. 5G).....	<i>O. mangun</i> sp. nov.
–	ALE separated by more than their radius (Tong and Li 2015: fig. 11F).....	<i>O. semilunata</i> Tong & Li, 2015
31	Epigastric region with a needle-like extension (Fig. 8H)	<i>O. taibao</i> sp. nov.
–	Without the aforementioned character	32
32	Endogyne with arch-shaped sclerite (Fig. 16E, F)	<i>O. wenshan</i> sp. nov.
–	Without the aforementioned character	33
33	Epigastric furrow with short fan-shaped extension (Tong and Li 2015: fig. 12C, D).....	<i>O. flabellata</i> Tong & Li, 2015
–	Without the aforementioned character	34
34	Booklung covers large.....	35
–	Booklung covers very small	36

- 35 Epigastric region with posterior scutal ridge, interrupted medially (Fig. 14H) *O. yuhuang* sp. nov.
 – Without the aforementioned character *O. furcula* Tong & Li, 2010
 36 Clypeus height about 0.5 times AME diameter 37
 – Clypeus height about 1.0 times AME diameter 38
 37 Epigastric region with a very small postgynal depression (Platnick and Dupérré 2009: figs 67, 68)
 *O. deserticola* Simon, 1892
 – Without the aforementioned character *O. foveolata* Roewer, 1963
 38 Central part of the anterior scutal ridge with a small round projection (Tong and Li 2015: fig. 15C) *O. zhengi* Tong & Li, 2015
 – Without the aforementioned character *O. media* Song & Xu, 1984

Opopaea foveolata Roewer, 1963

Figs 1–3, 17

Opopaea foveolata Roewer, 1963: 121, fig. 6e–h. Holotype from Ajayan, Guam, Apr. 1945, Dybas; not examined.

Opopaea sauteri Tong & Li, 2010: 35, figs 1G, N, P, R, U, 6A–G (misidentified).

Opopaea sauteri Tong, 2013: 42, figs 25G, N, P, R, U, 61A–G (misidentified).

Opopaea foveolata Baehr et al., 2013: 114, figs 5A–I, 6A–G.

Material examined. 1♂1♀ (SYNU-623–624), **CHINA, Hainan**, Lingshui Li Autonomous County, Diaolushan Mountain, roadside to the waterfall (18°40.440'N, 109°52.600'E, 494 m elev.), 10 August 2010, G. Zheng leg.; 2♂1♀ (SYNU-625–627), Jianfengling National Reserve, intersection of District 5, 13 August 2010, G. Zheng leg.; 1♂ (SYNU-628), Jianfengling, roadside near Tianchi; 1♂1♀ (SYNU-629–630), Jianfengling, Tiger Roar and Dragon Song Scenic Area (18°44.885'N, 108°52.268'E, 900 m elev.), 20 July 2007, C. Wang leg.; 1♀ (SYNU-629), Yinggeling National Reserve, Yinggezui protection station, 24 August 2010, G. Zheng leg.

Diagnosis and description. See Baehr et al. (2013).

Comment. *Opopaea foveolata* was originally described from numerous specimens collected throughout Micronesia, including the types from Guam (Roewer 1963). Tong and Li (2010) misidentified this species as *Opopaea sauteri* Brignoli, 1974, based on specimens collected from Hainan Island. Baehr et al. (2013) re-described this species from numerous specimens collected from Pacific Islands with detailed descriptions and figures. We re-checked the specimens from Hainan, which sufficiently match the description and illustrations of Baehr et al. (2013) to be confident of their identity.

Distribution. Newly recorded from Hainan Island. According to Baehr et al. (2013), this species is widespread in the Pacific Region and is known from many different islands.

Opopaea mangun Tong & Li, sp. nov.

<https://zoobank.org/281F7530-0985-433B-9712-92489CDF428C>

Figs 4–6, 16A, B, 17

Type material. *Holotype*: ♂ (SYNU-541), **CHINA, Yunnan**, Menghai County, Mangun Stockaded Village (22°02'12"N, 100°23'28"E, 1179 m elev.), 20 March

2016, S. Li leg. **Paratypes**: 2♀ (SYNU-542–543), same data as holotype.

Etymology. The specific name refers to the type locality and is a noun in apposition.

Diagnosis. This new species is similar to *Opopaea macula* Tong & Li, 2015 in the large booklung covers and morphology of the scuto-pedical region, but can be distinguished by the acute tip of bulbus (Fig. 6I) vs. round tip (Tong and Li 2015: fig. 7A) and the semicircular-shaped postgynal depression (Figs 5H, 16A) vs. very narrow (Tong and Li 2015: fig. 7D).

Description. **Male** (holotype). Measurements: TL: 1.64; CL: 0.69; CW: 0.53; AL: 0.89; AW: 0.53; ALE: 0.07; PME: 0.06; PLE: 0.05; EGW: 0.18; ALE-ALE: 0.03; ALE-PLE: 0.01; PME-PME: 0; PLE-PME: 0.01; CBL: 0.25; CBW: 0.08; PTL: 0.26; FI: 0.09; FML: 0.10. Colouration: yellow, abdominal interscutal areas creamy-white, booklung covers brown, pedipalps reddish-brown. Habitus as in Fig. 4A, C, E. Carapace (Fig. 4B, F): oval in dorsal view; sides with longitudinal streaks; median area smooth with rows of setae at lateral edges. Eyes (Fig. 4B, G): ALE largest, PLE smallest; posterior eye row straight viewed from above, procurved from front; ALE separated by less than their radius, ALE–PLE separated by less than ALE radius, PME touching throughout most of their length, PLE–PME separated by less than PME radius. Clypeus height about 1.0 times ALE diameter (Fig. 4G). Sternum (Fig. 4D) longer than wide, fused to carapace; surface smooth; radial furrows present between coxae I–II, II–III and III–IV, with rows of small pits. Abdomen: booklung covers large, ovoid, without setae. Pedicel tube short, ribbed, with small, dorsolateral triangular extensions, scuto-pedicel region lower than pedicel diameter, with straight scutal ridges (Fig. 4H). Palp (Fig. 6A–K): femur slightly shorter than half length of patella and submedially attached to patella; patella strongly enlarged, elongate oval; tibia small, rounded; cymbiobulbus as long as the patella; bulb ventrally straight, tip acute, ventral with prolateral folded ridges (pr).

Female. As in male, except as noted. Measurements: TL: 1.84; CL: 0.72; CW: 0.55; AL: 1.10; AW: 0.72; ALE: 0.06; PME: 0.05; PLE: 0.05; EGW: 0.18; ALE-ALE: 0.03; ALE-PLE: 0.01; PME-PME: 0; PLE-PME: 0.01. Habitus as in Fig. 5A, C, E. Copulatory organ (Figs 5H, 16A, B): posterior margin of epigastric scutal ridge (asr) smooth, postgynal depression (pd) semicircular-shaped; dorsally with nail-like process (na) connected to paddle-like sclerite (pls) bearing thin, straight arms.

Distribution. Known only from the type locality.

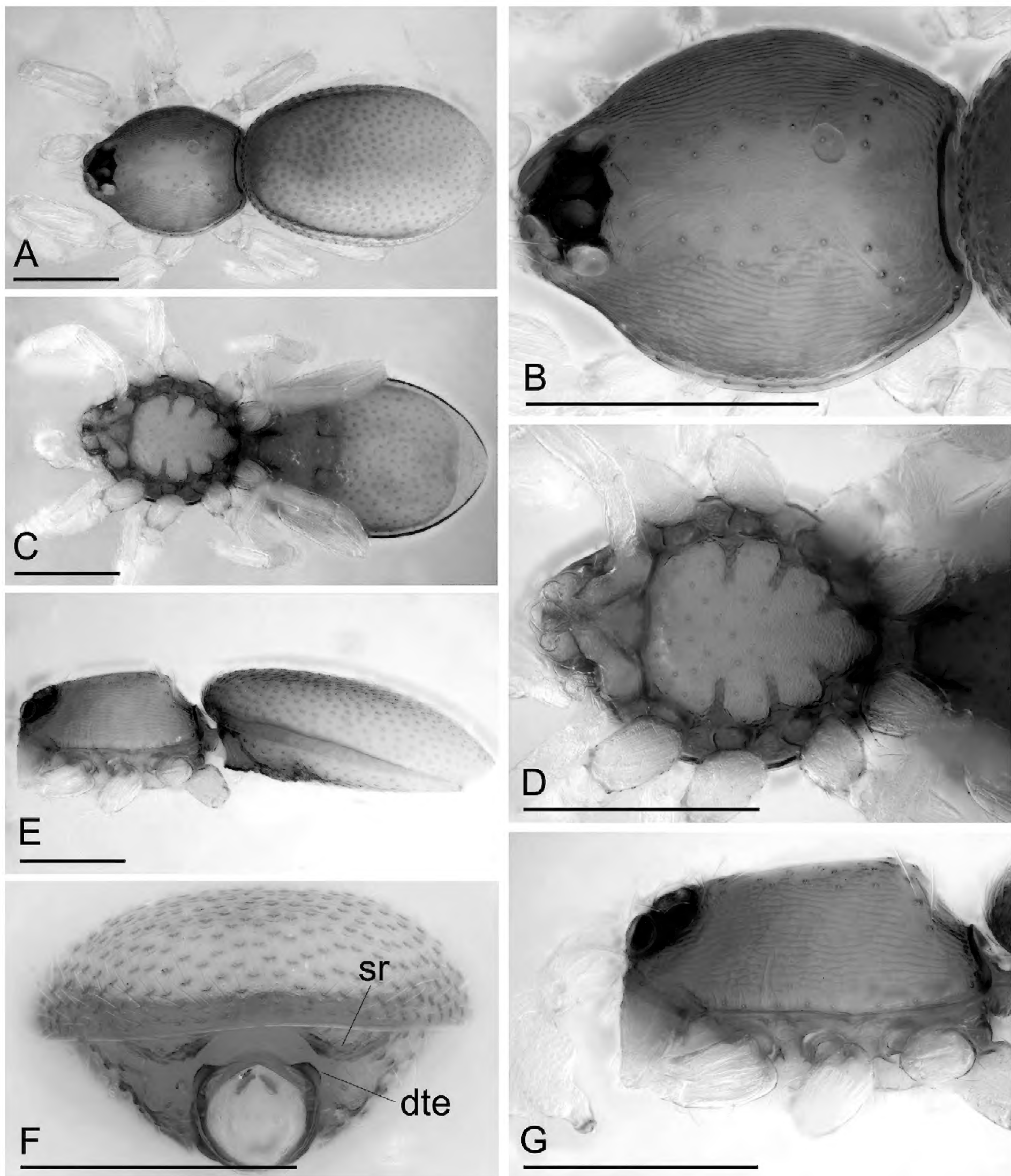


Figure 1. *Opopaea foveolata* Roewer, 1963, male. **A, C, E** Habitus, dorsal, ventral and lateral views; **B, D, G** Prosoma, dorsal, ventral and lateral views; **F** Abdomen, anterior view. Abbreviations: dte = dorsolateral, triangular extensions; sr = scutal ridge. Scale bars: 0.4 mm.

***Opopaea taibao* Tong & Yang, sp. nov.**

<https://zoobank.org/AB3810A7-1924-4FA3-8AE0-7E3D943897ED>

Figs 7–9, 16C, D, 17

Type material. *Holotype*: ♂ (SYNU-539), **CHINA, Yunnan**, Baoshan City, Taibao Park (25°07'13.6"N, 99°09'15.0"E, 1752 m elev.), 3 November 2011, Z. Yang & H. Pu leg. *Paratypes*: 3♀ (SYNU-540–542), same data as holotype.

Etymology. The specific name refers to the type locality and is a noun in apposition.

Diagnosis. This new species is similar to *Opopaea deserticola* Simon, 1892 in the small booklung covers and morphology of the scuto-pedichel region, but can be distinguished by the large needle-like extension of the epigastric region (Fig. 8H) vs. lacking the needle-like extension (Platnick and Dupérre 2009: fig. 32) and the round tip

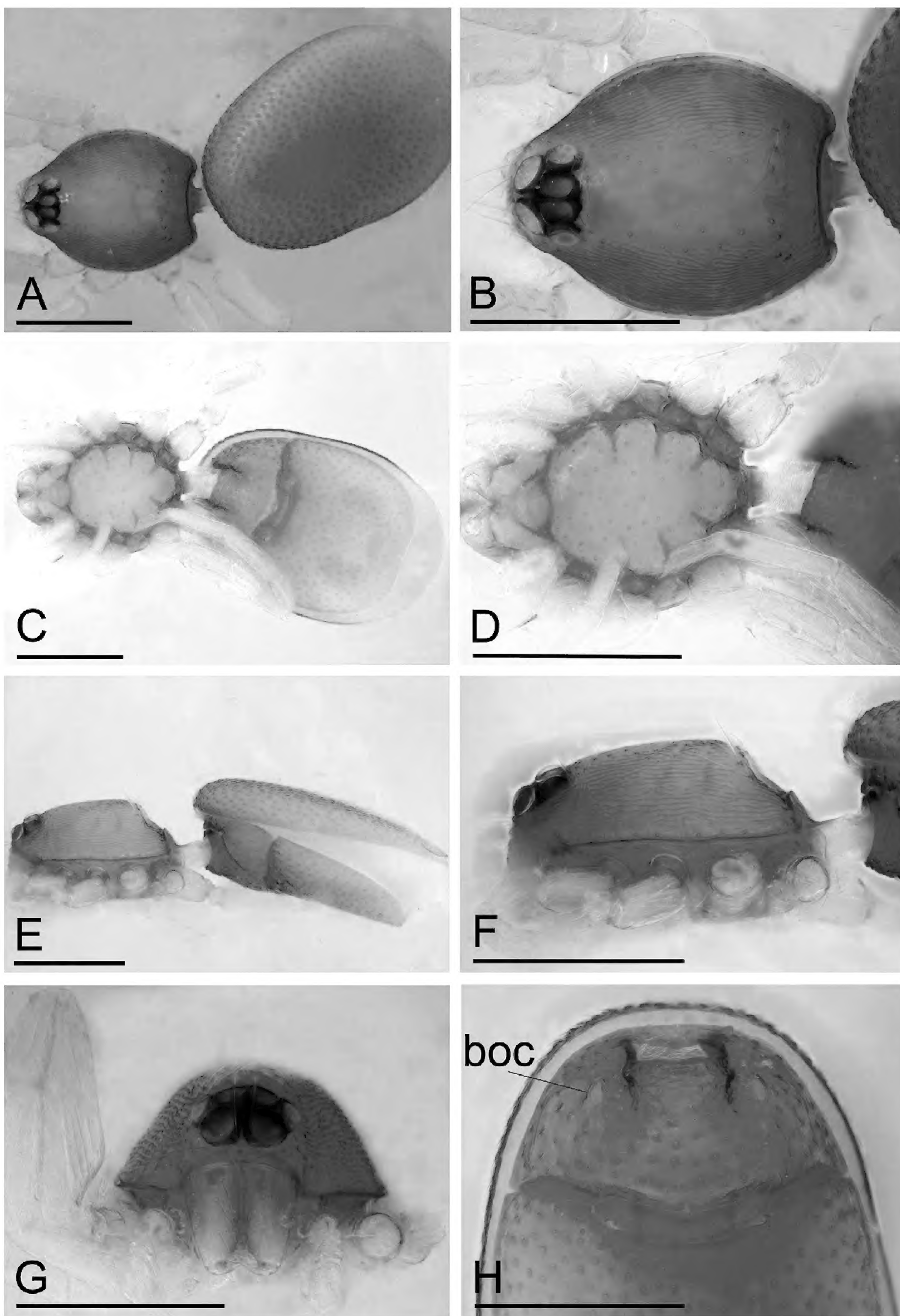


Figure 2. *Opopaea foveolata* Roewer, 1963, female. **A, C, E** Habitus, dorsal, ventral and lateral views; **B, D, F, G** Prosoma, dorsal, ventral, lateral and anterior views; **H** Abdomen, ventral view. Abbreviation: boc = booklung covers. Scale bars: 0.4 mm.

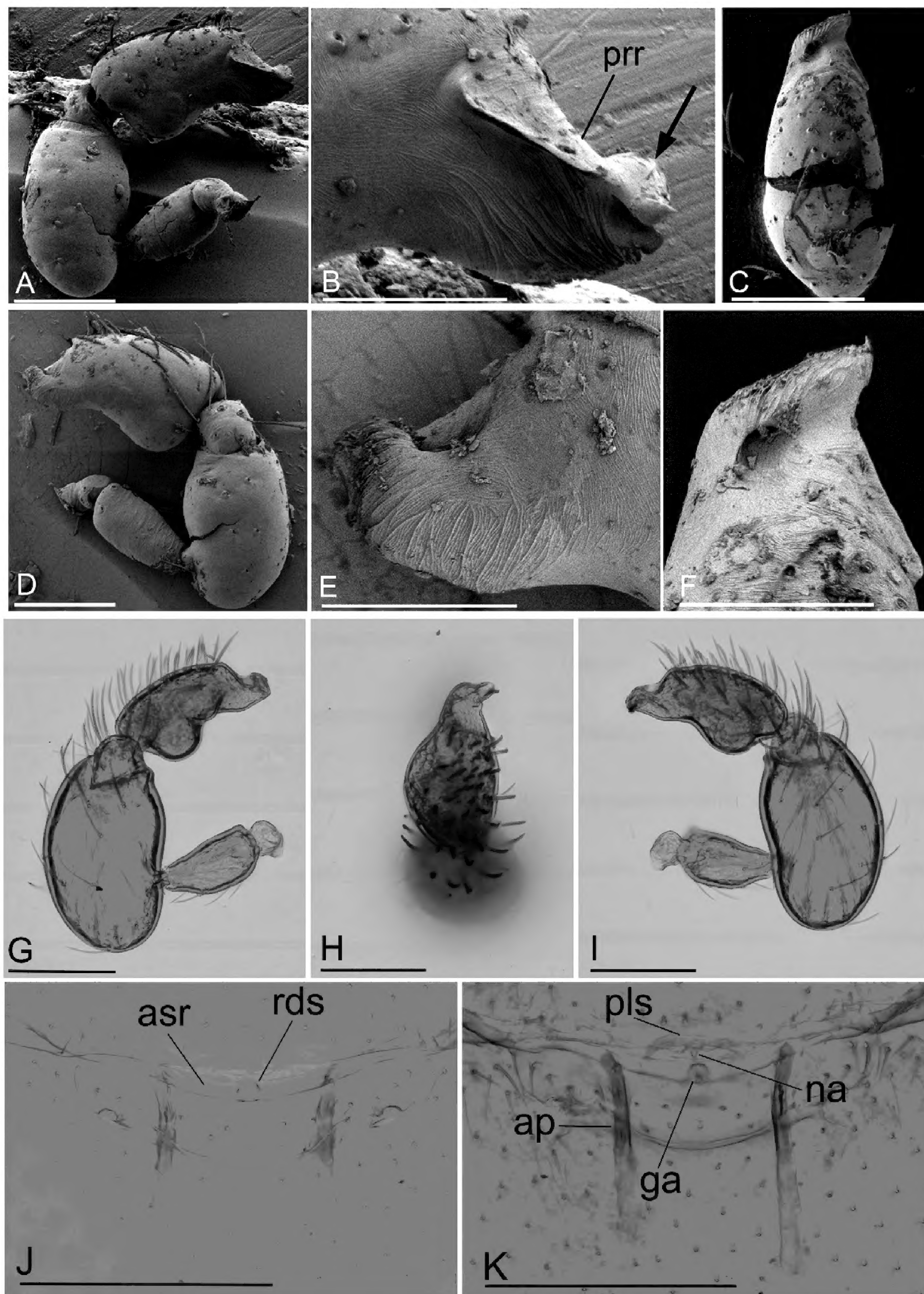


Figure 3. *Opopaea foveolata* Roewer, 1963, male left palp (A–I) and female copulatory organ (J, K). A, G Prolateral view; B, E, F Distal part of cymbiobulbus, prolateral, retrolateral and dorsal views, arrow shows the enlarged distal part; C, H Dorsal view; D, I Retrolateral view; J Ventral view; K Dorsal view. Abbreviation: ap = apodeme; asr = anterior scutal ridge; ga = globular appendix; na = nail-like process; pls = paddle-like sclerite; prr = prolateral ridge; rds = round dark spot. Scale bars: 0.1 mm (A, C, D, G–I); 0.05 mm (B, E, F); 0.2 mm (J, K).

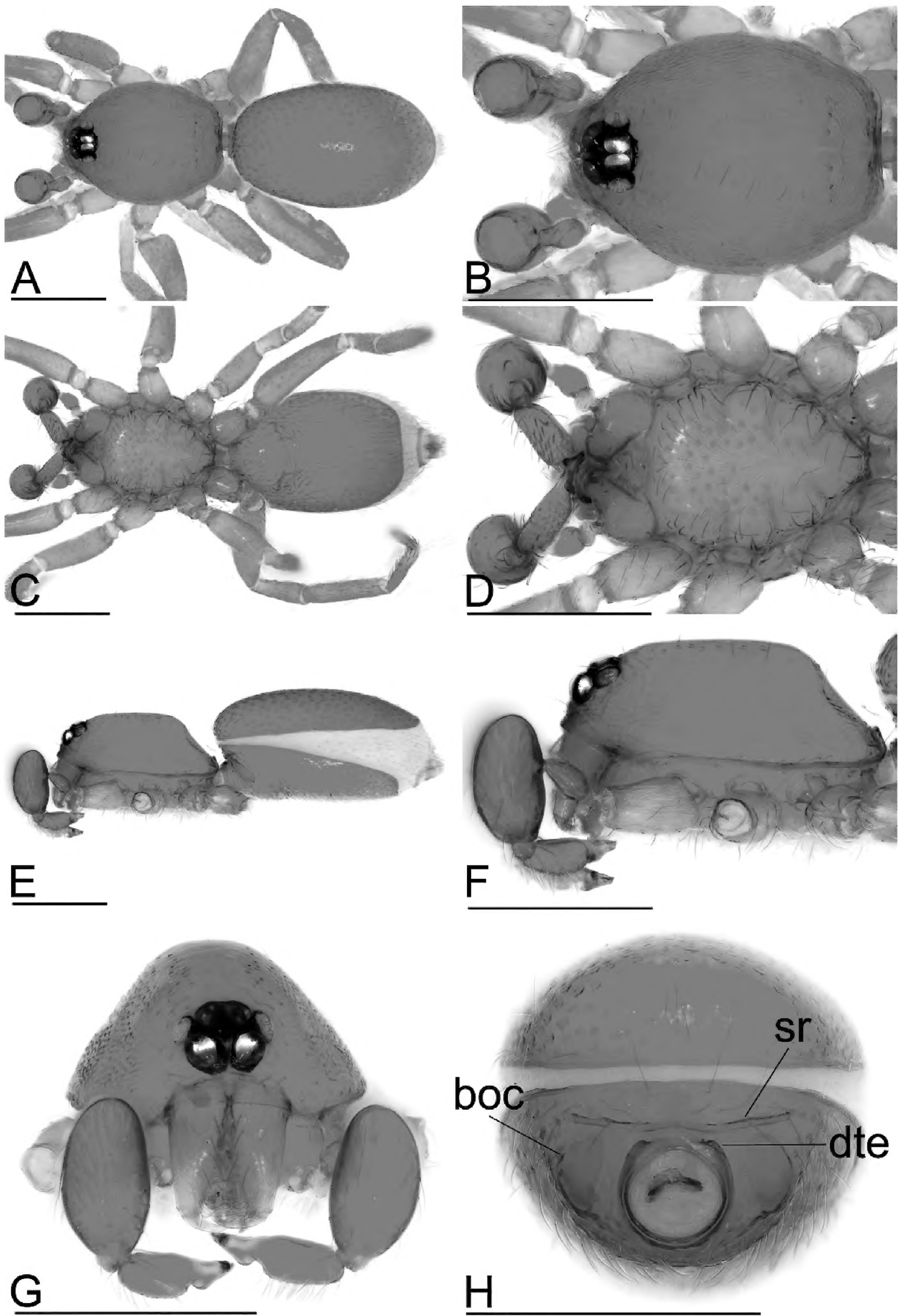


Figure 4. *Opopaea mangun* sp. nov., male. **A, C, E** Habitus, dorsal, ventral and lateral views; **B, D, F, G** Prosoma, dorsal, ventral, lateral and anterior views; **H** Abdomen, anterior view. Abbreviations: boc = booklung covers; dte = dorsolateral, triangular extensions; sr = scutal ridge. Scale bars: 0.4 mm.

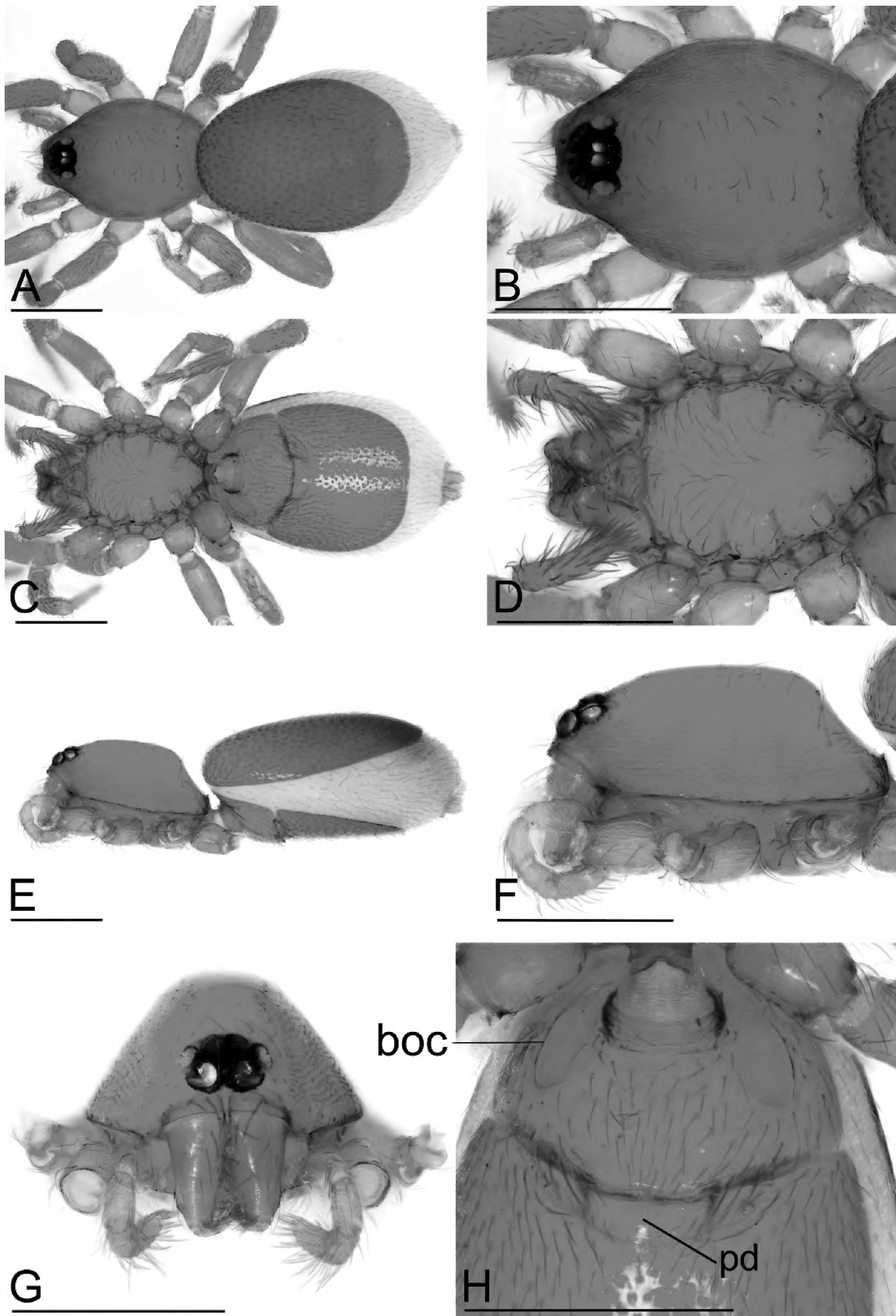


Figure 5. *Opopaea mangun* sp. nov., female. **A, C, E** Habitus, dorsal, ventral and lateral views; **B, D, F, G** Prosoma, dorsal, ventral, lateral and anterior views; **H** Abdomen, ventral view. Abbreviations: boc = booklung covers; pd = postgynal depression. Scale bars: 0.4 mm.

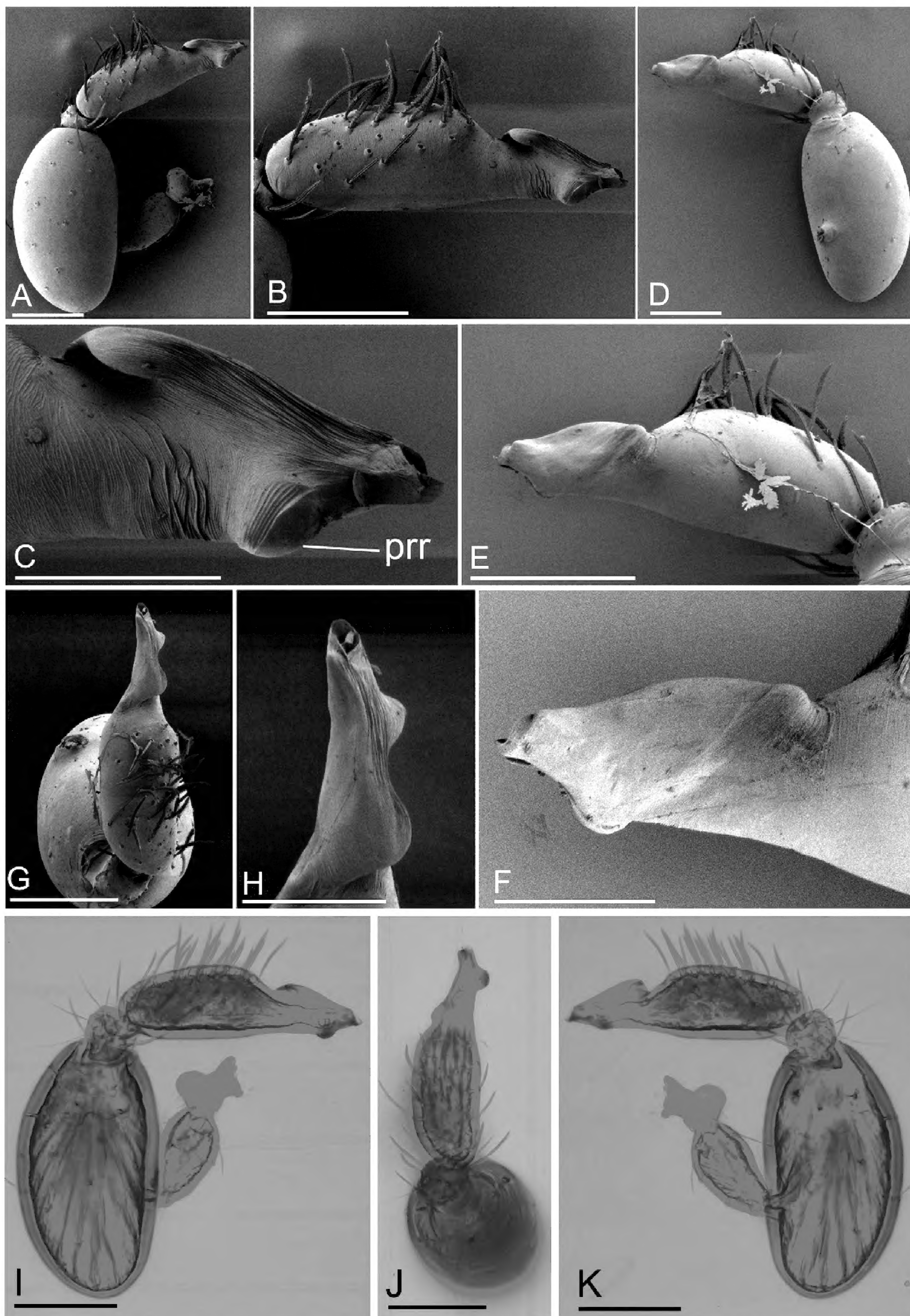


Figure 6. *Opopaea mangun* sp. nov., male left palp. **A, I** Prolateral view; **B, E** Cymbiobulbus, prolateral and retrolateral views; **C, F, H** Distal part of cymbiobulbus, prolateral, retrolateral and dorsal views; **D, K** Retrolateral view; **G, J** Dorsal view. Abbreviation: prr = prolateral ridge. Scale bars: 0.1 mm (**A, B, D, E, G, I–K**); 0.05 mm (**C, F, H**).

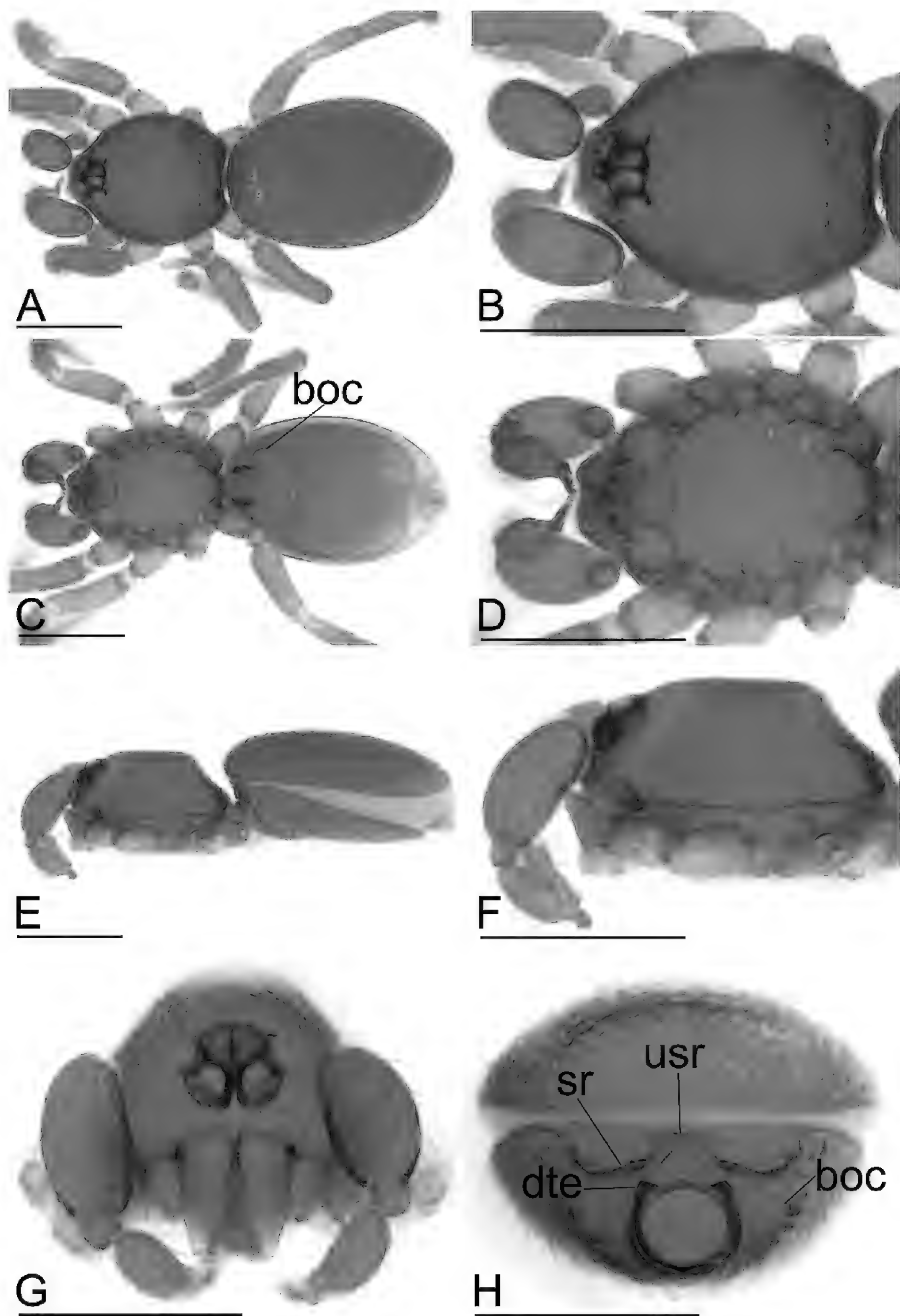


Figure 7. *Opopaea taibao* sp. nov., male. **A, C, E** Habitus, dorsal, ventral and lateral views; **B, D, F, G** Prosoma, dorsal, ventral, lateral and anterior views; **H** Abdomen, anterior view. Abbreviations: boc = booklung covers; dte = dorsolateral, triangular extensions; sr = scutal ridge; usr = upper scutal ridge. Scale bars: 0.4 mm.

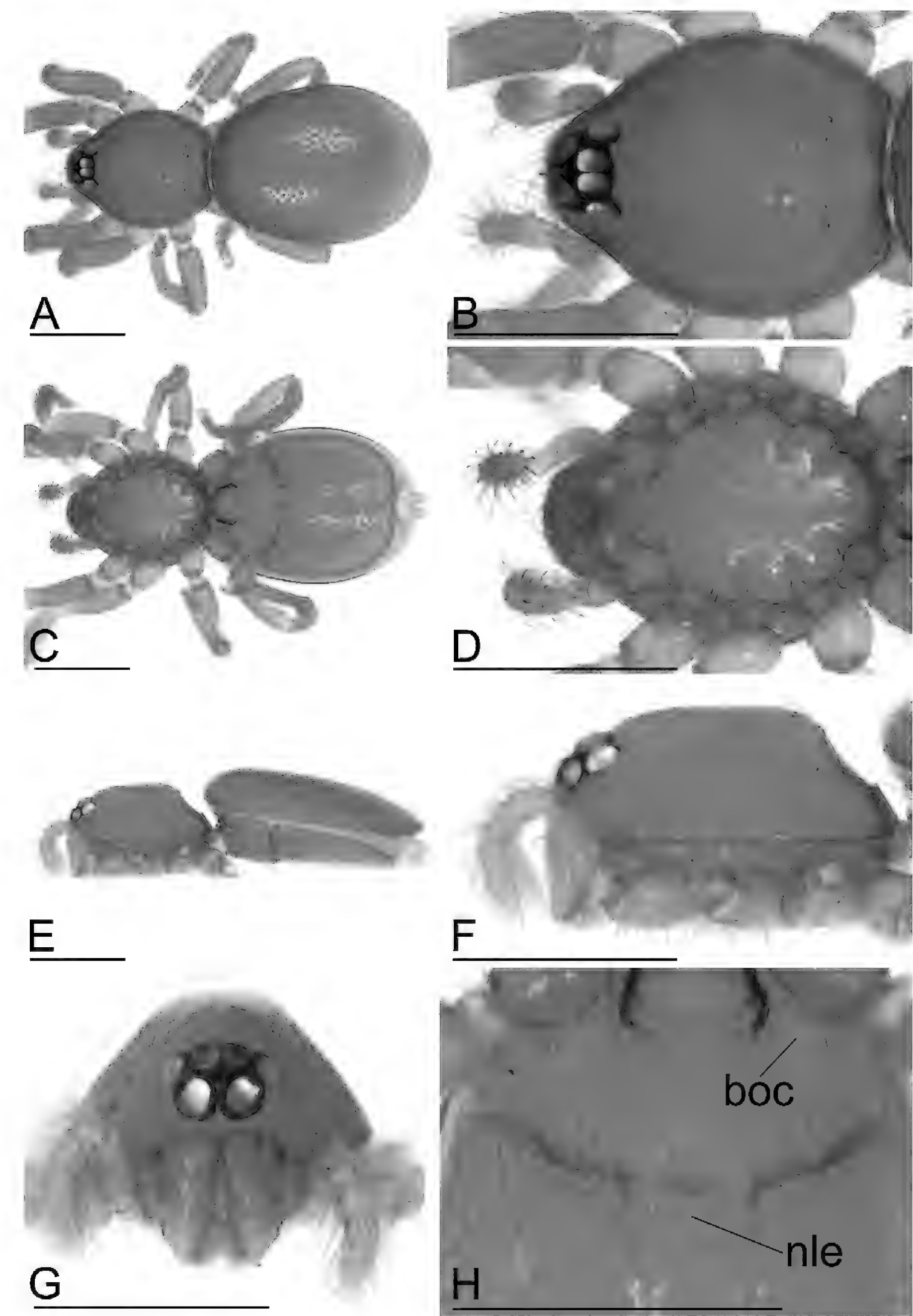


Figure 8. *Opopaea taibao* sp. nov., female. **A, C, E** Habitus, dorsal, ventral and lateral views; **B, D, F, G** Prosoma, dorsal, ventral, lateral and anterior views; **H** Abdomen, ventral view. Abbreviations: boc = booklung covers; nle = needle-like extension. Scale bars: 0.4 mm.

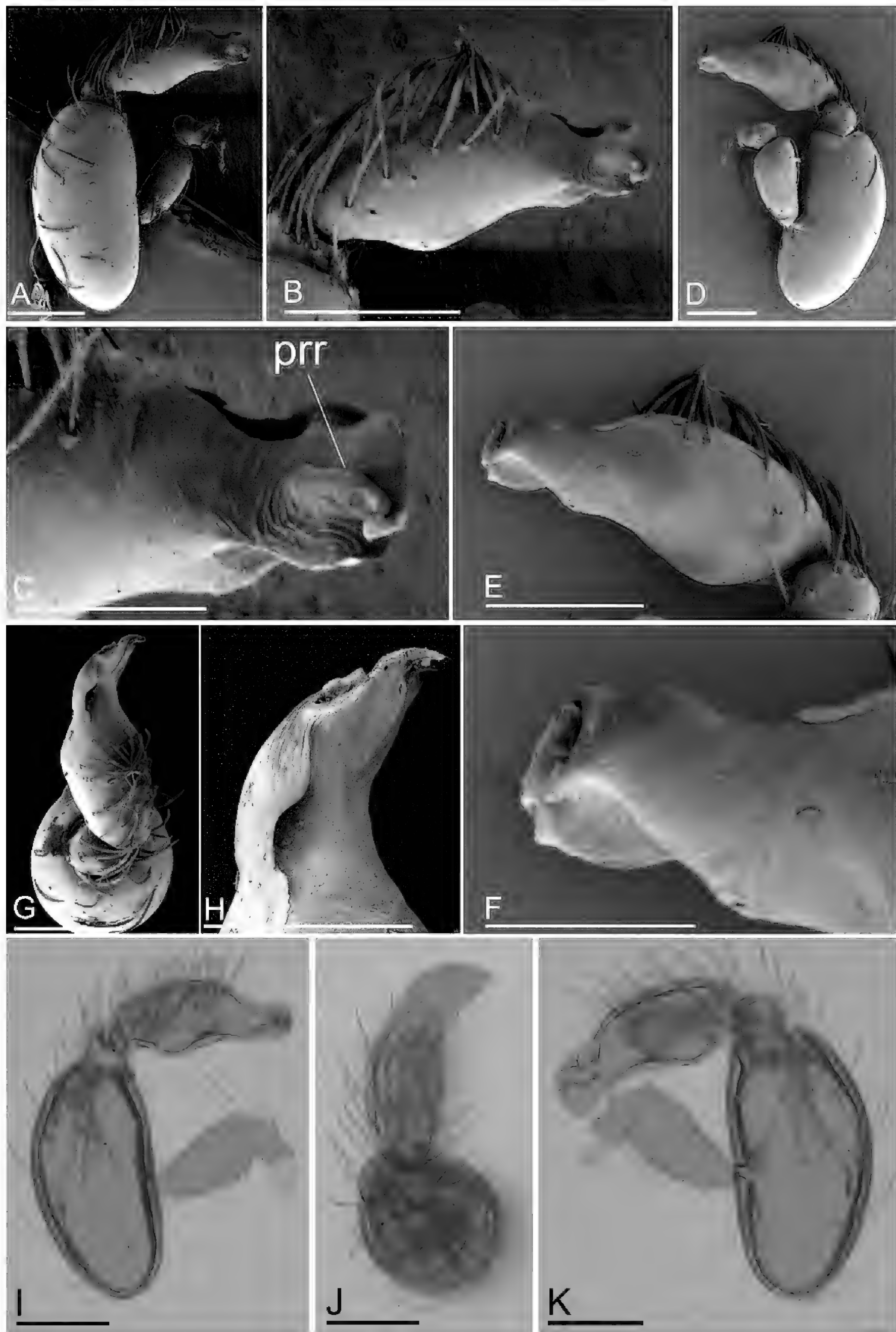


Figure 9. *Opopaea taibao* sp. nov., male left palp. **A, I** Prolateral view; **B, E** Cymbiobulbus, prolateral and retrolateral views; **C, F, H** Distal part of cymbiobulbus, prolateral, retrolateral and dorsal views; **D, K** Retrolateral view; **G, J** Dorsal view. Abbreviation: prr = prolateral ridge. Scale bars: 0.1 mm (**A, B, D, E, G, I–K**); 0.05 mm (**C, F, H**).

of distal part of palp (Fig. 9C, I) vs. narrow tip ventrally expanded (Platnick and Dupérré 2009: figs 55, 64).

Description. Male (holotype). Measurements: TL: 1.47; CL: 0.61; CW: 0.51; AL: 0.86; AW: 0.57; ALE: 0.07; PME: 0.06; PLE: 0.06; EGW: 0.21; ALE-ALE: 0.03; ALE-PLE: 0.01; PME-PME: 0; PLE-PME: 0; CBL: 0.20; CBW: 0.08; PTL: 0.27; FI: 0.11; FML: 0.11. Colouration: legs yellowish, carapace and abdomen yellow, abdominal interscutal areas creamy-white, booklung covers yellowish, pedipalps reddish-brown. Habitus as in Fig. 7A, C, E. Carapace (Fig. 7B, F): oval in dorsal view; sides with longitudinal streaks; median area smooth with rows of setae at lateral edges. Eyes (Fig. 7B, G): ALE largest, PLE and PME nearly equal size; posterior eye row recurved viewed from above, procurved from front; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Clypeus height about 1.0 times ALE diameter (Fig. 7G). Sternum (Fig. 7D) longer than wide, fused to carapace; surface smooth; radial furrows present between coxae I-II, II-III and III-IV, with rows of small pits; endites anteriorly with a small, sharply-pointed projection. Abdomen: booklung covers very small, ovoid, without setae. Pedicel tube short, ribbed, with small, dorsolateral triangular extensions, scuto-pedicel region lower than pedicel diameter, with arched scutal ridges and straight upper scutal ridge (Fig. 7H). Palp (Fig. 9A-K): femur slightly shorter than half length of patella and submedially attached to patella; patella strongly enlarged, elongate oval; tibia small, rounded; cymbiobulbus shorter than the patella; bulb ventrally strongly bulging, tip broad, with prolateral folded ridges (prf).

Female. As in male, except as noted. Measurements: TL: 1.54; CL: 0.62; CW: 0.52; AL: 0.93; AW: 0.68; ALE: 0.07; PME: 0.06; PLE: 0.06; EGW: 0.20; ALE-ALE: 0.03; ALE-PLE: 0.01; PME-PME: 0; PLE-PME: 0. Habitus as in Fig. 8A, C, E. Copulatory organ (Figs 8H, 16C, D): in the middle of the epigastric scutal ridge, there is a needle-like extension (nle); dorsally with nail-like process (na) connected to paddle-like sclerite (pls) bearing long, fork-like arms.

Distribution. Known only from the type locality.

***Opopaea wenshan* Tong & Zhang, sp. nov.**

<https://zoobank.org/F0D61E77-D8F5-4161-A6B4-99145DC1A6E1>

Figs 10–12, 16E, F, 17

Type material. Holotype: ♂ (SYNU-568), CHINA, Yunnan, Wenshan Zhuang and Miao Autonomous Prefecture, Funing County, Central National Level Ecological Forest, Z. Li & G. Zhou leg. **Paratypes:** 4♀ (SYNU-565–567, 569), same data as holotype.

Etymology. The specific name refers to the type locality and is a noun in apposition.

Diagnosis. This new species is similar to *Opopaea rigidula* Tong & Li, 2015 in the ear-shaped tip of palpal bulb, but can be distinguished by the triangular protrusion of palpal bulb (Fig. 12C, I) vs. lacking the protrusion (Tong and Li 2015: figs 10A–D), the large prolateral ridge of male palp (Fig. 12A, I) vs. very small (Tong and Li 2015: fig. 10C) and the arch-shaped sclerite of endogyne (Figs 11H, 16E, F) vs. lacking the arch-shaped sclerite (Tong and Li 2015: fig. 12E, F).

Description. Male (holotype). Measurements: TL: 1.83; CL: 0.83; CW: 0.68; AL: 0.99; AW: 0.91; ALE: 0.10; PME: 0.08; PLE: 0.07; EGW: 0.24; ALE-ALE: 0.05; ALE-PLE: 0.01; PME-PME: 0; PLE-PME: 0; CBL: 0.29; CBW: 0.10; PTL: 0.44; FI: 0.21; FML: 0.11. Colouration: legs yellow, carapace and abdomen scuta yellow-brown, abdominal interscutal areas creamy-white, pedipalps reddish-brown. Habitus as in Fig. 10A, C, E. Carapace (Fig. 10A, E): oval in dorsal view; sides with longitudinal streaks; median area smooth with rows of setae at lateral edges. Eyes (Fig. 10A, F): ALE largest, PLE smallest; posterior eye row straight viewed from above, procurved from front; ALE separated by their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Clypeus height about 1.5 times ALE diameter (Fig. 10F). Sternum (Fig. 10C) longer than wide, fused to carapace; surface smooth; radial furrows present between coxae I-II, II-III and III-IV, with rows of small pits; endites anteriorly strongly sclerotised. Abdomen: booklung covers small, ovoid, without setae. Pedicel tube short, ribbed, with small, dorsolateral triangular extensions, scuto-pedicel region lower than pedicel diameter, with arched scutal ridges and curved upper scutal ridge (Fig. 10G). Palp (Fig. 12A–K): femur very small, about 1/4 length of patella and submedially attached to patella; patella strongly enlarged, elongate oval; tibia small, rounded; cymbiobulbus shorter than the patella; bulb ventrally slightly bulging, dorsally with one triangular protrusion, tip ear-shaped, with two largely-folded ridges.

Female. As in male, except as noted. Measurements: TL: 2.00; CL: 0.81; CW: 0.65; AL: 1.19; AW: 0.87; ALE: 0.07; PME: 0.06; PLE: 0.05; EGW: 0.22; ALE-ALE: 0.05; ALE-PLE: 0.01; PME-PME: 0; PLE-PME: 0. Habitus as in Fig. 11A, C, E. Copulatory organ (Figs 11H, 16E, F): posterior margin of epigastric scutal ridge smooth; dorsally with nail-like process (na) connected to paddle-like sclerite (pls); with an arch shaped sclerite (ass).

Distribution. Known only from the type locality.

***Opopaea yuhuang* Tong & Li, sp. nov.**

<https://zoobank.org/7BF565FE-8C35-428E-83D1-71C987896683>

Figs 13–15, 16G, H, 17

Type material. Holotype: ♂ (SYNU-596), CHINA, Yunnan, Mile City, Yuhuang Park, 20 November 2021, W. Cheng leg. **Paratypes:** 1♀ (SYNU-597), 2♂2♀ (SYNU-619–622), same data as holotype.

Etymology. The specific name refers to the type locality and is a noun in apposition.

Diagnosis. This new species is similar to *Opopaea syarakui* (Komatsu, 1967) in the morphology of the scu-

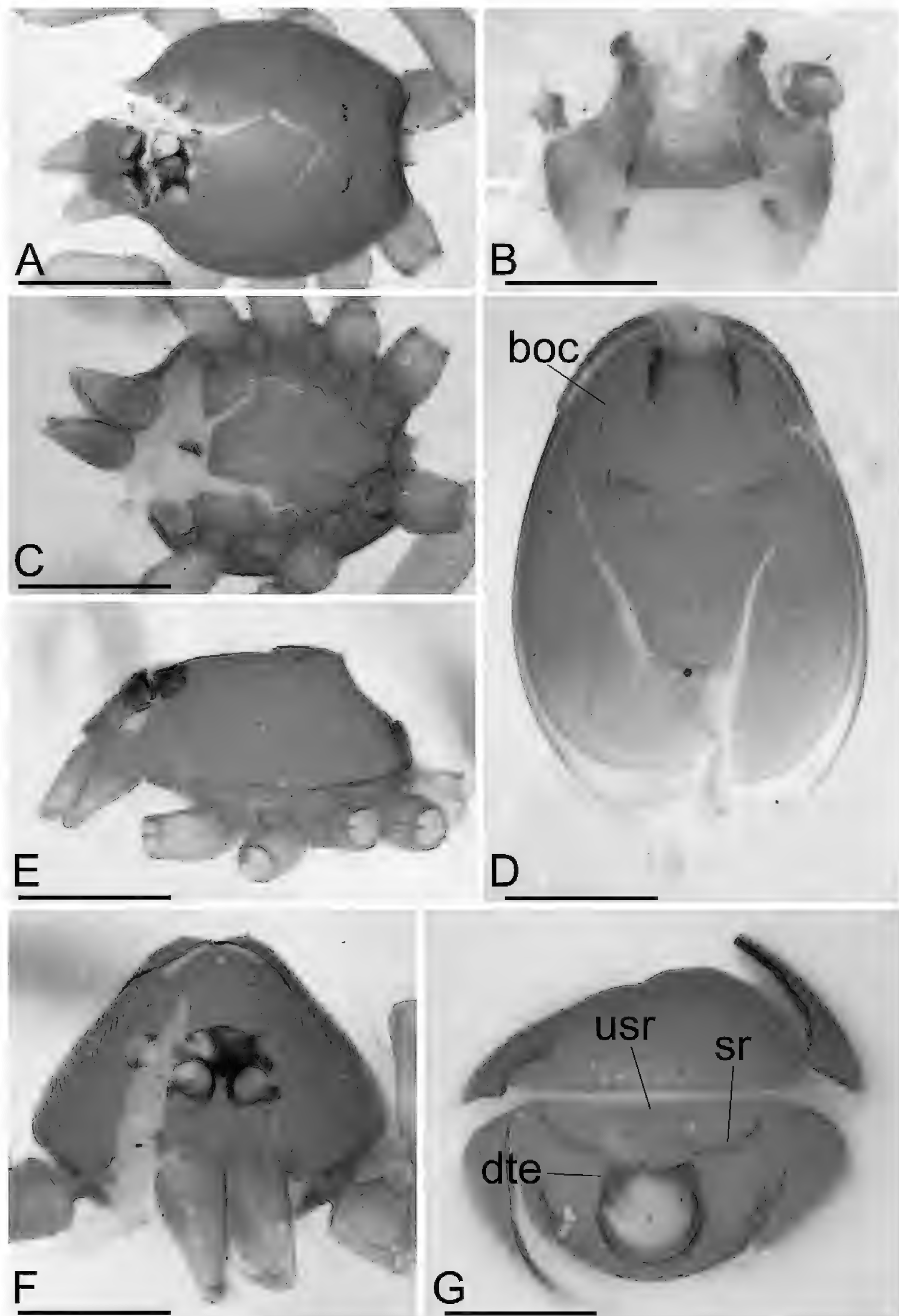


Figure 10. *Opopaea wenshan* sp. nov., male. **A, C, E, F** Prosoma, dorsal, ventral, lateral and anterior views; **B** Labium and endites, ventral view; **D, G** Abdomen, ventral and anterior views. Abbreviations: boc = booklung covers; dte = dorsolateral, triangular extensions; sr = scutal ridge; usr = upper scutal ridge. Scale bars: 0.4 mm.

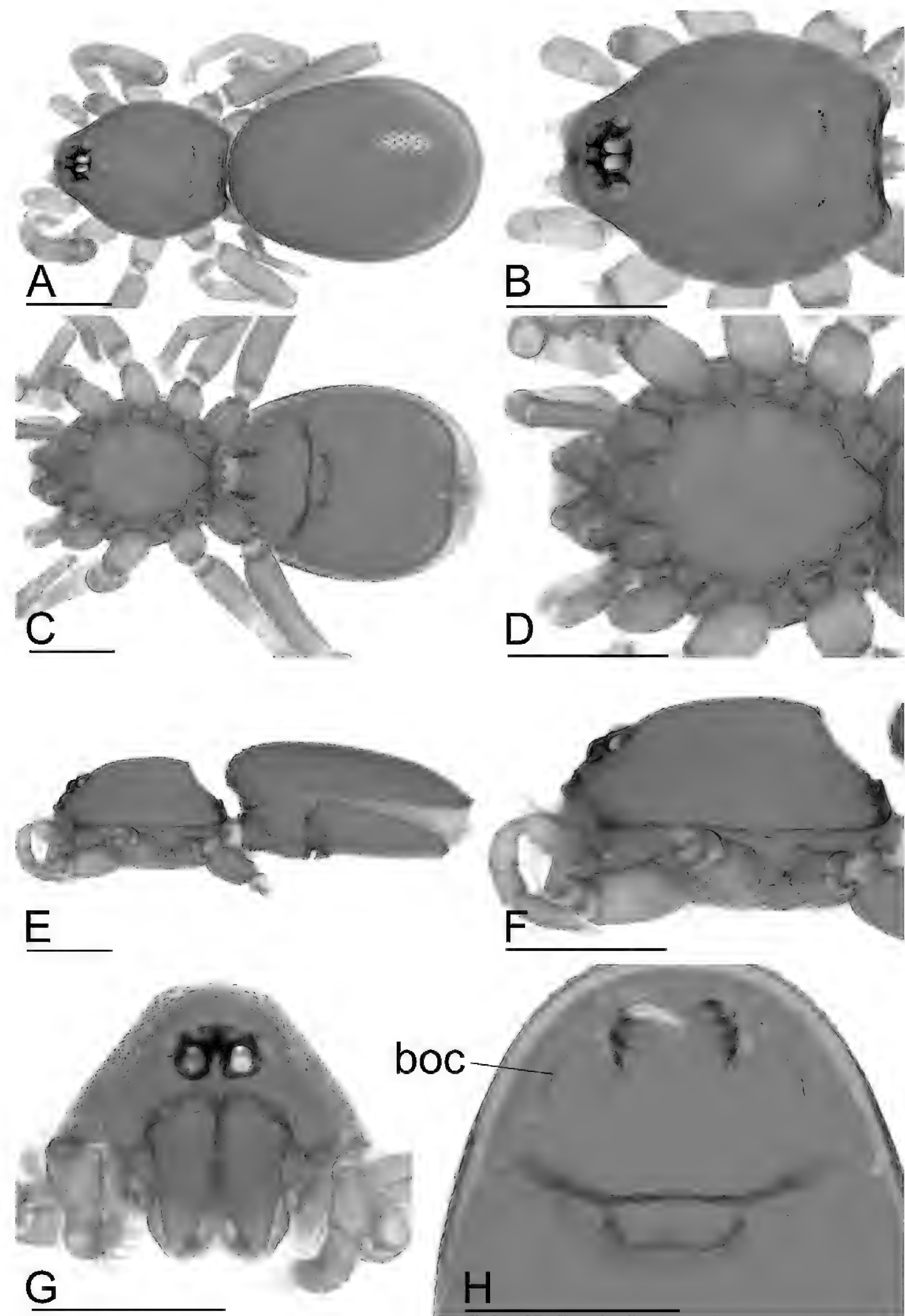


Figure 11. *Opopaea wenshan* sp. nov., female. **A, C, E** Habitus, dorsal, ventral and lateral views; **B, D, F, G** Prosoma, dorsal, ventral, lateral and anterior views; **H** Abdomen, ventral view. Abbreviation: boc = booklung covers. Scale bars: 0.4 mm.

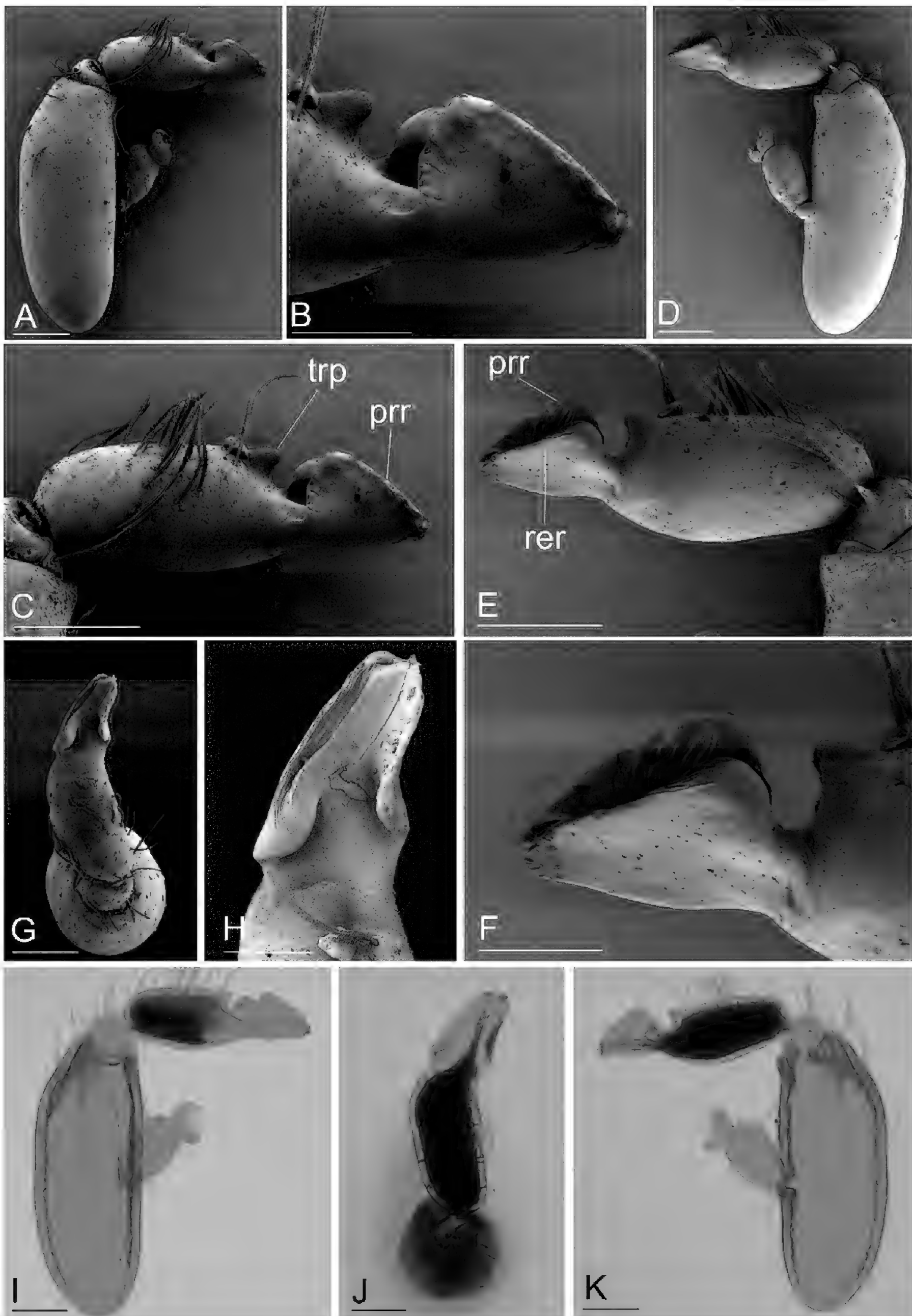


Figure 12. *Opopaea wenshan* sp. nov., male left palp. **A, I** Prolateral view; **B, F, H** Distal part of cymbiobulbus, prolateral, retrolateral and dorsal views; **C, E** Cymbiobulbus, prolateral and retrolateral views; **D, K** Retrolateral view; **G, J** Dorsal view. Abbreviations: pr = prolateral ridge; rer = retrolateral ridge; trp = triangular protrusion. Scale bars: 0.1 mm (**A, C–E, G, I–K**); 0.05 mm (**B, F, H**).

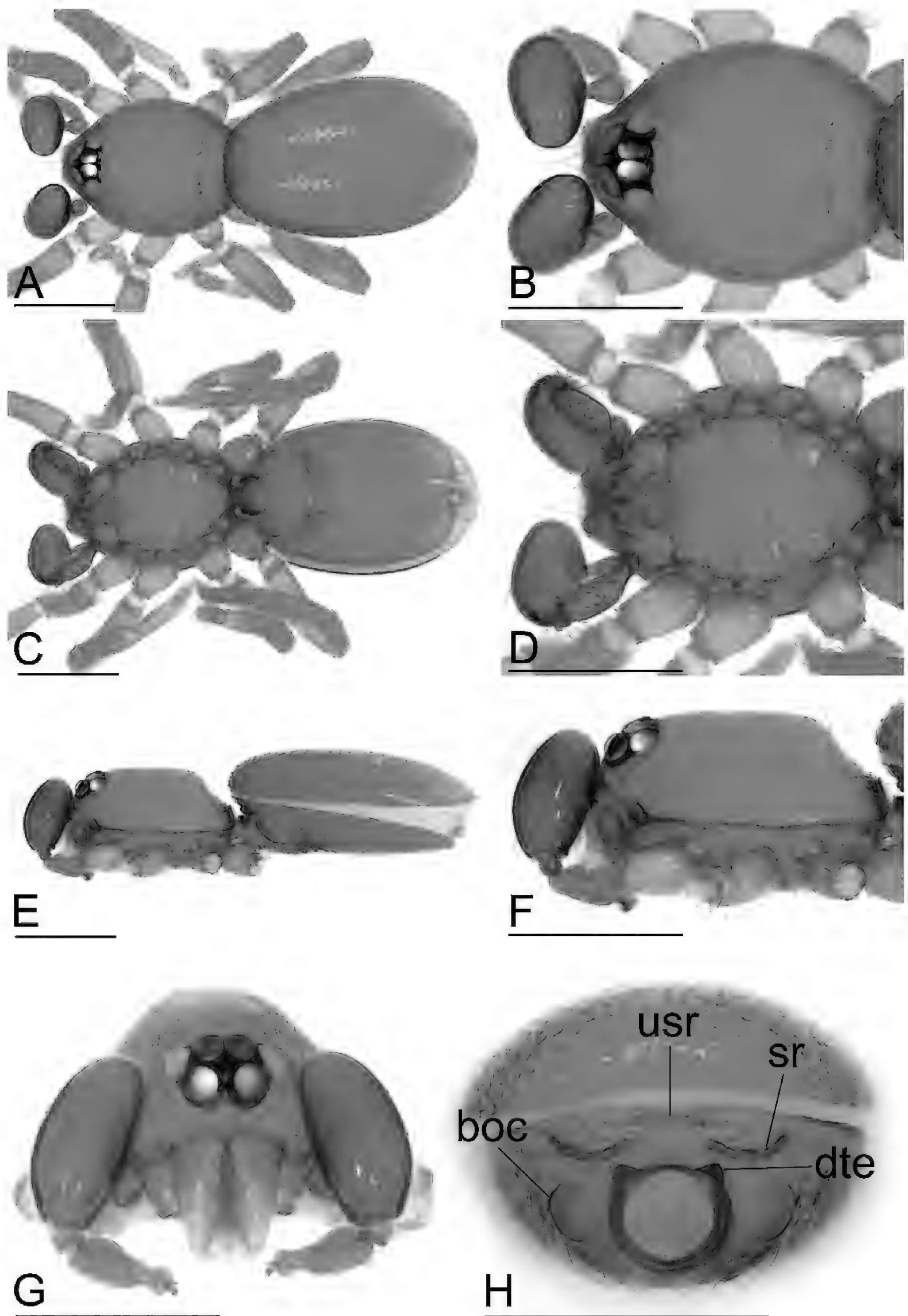


Figure 13. *Opopaea yuhuang* sp. nov., male. **A, C, E** Habitus, dorsal, ventral and lateral views; **B, D, F, G** Prosoma, dorsal, ventral, lateral and anterior views; **H** Abdomen, anterior view. Abbreviations: boc = booklung covers; dte = dorsolateral, triangular extensions; sr = scutal ridge; usr = upper scutal ridge. Scale bars: 0.4 mm.

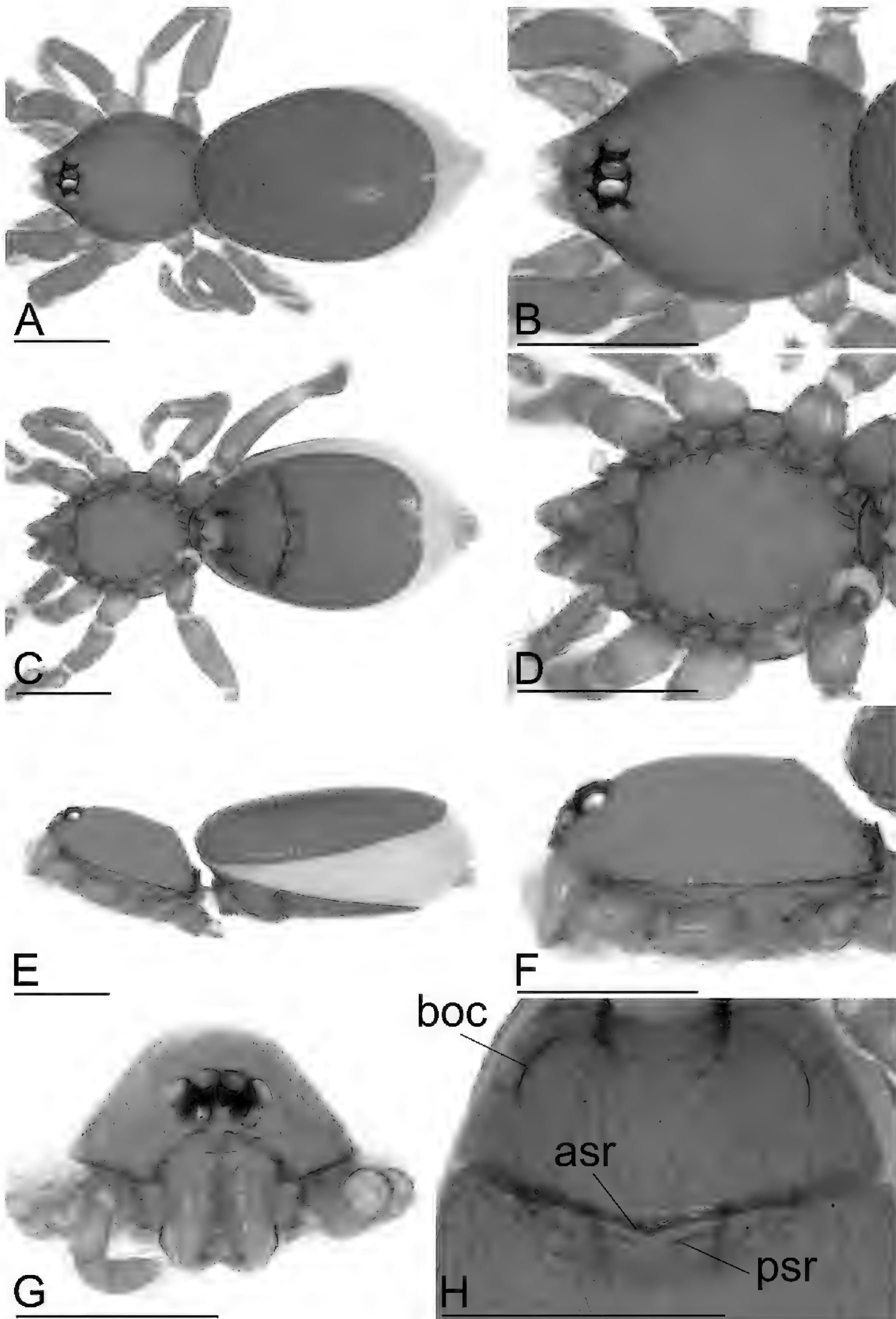


Figure 14. *Opopaea yuhuang* sp. nov., female. **A**, **C**, **E** Habitus, dorsal, ventral and lateral views; **B**, **D**, **F**, **G** Prosoma, dorsal, ventral, lateral and anterior views; **H** Abdomen, ventral view. Abbreviations: asr = anterior scutal ridge; boc = booklung covers; psr = posterior scutal ridge. Scale bars: 0.4 mm.

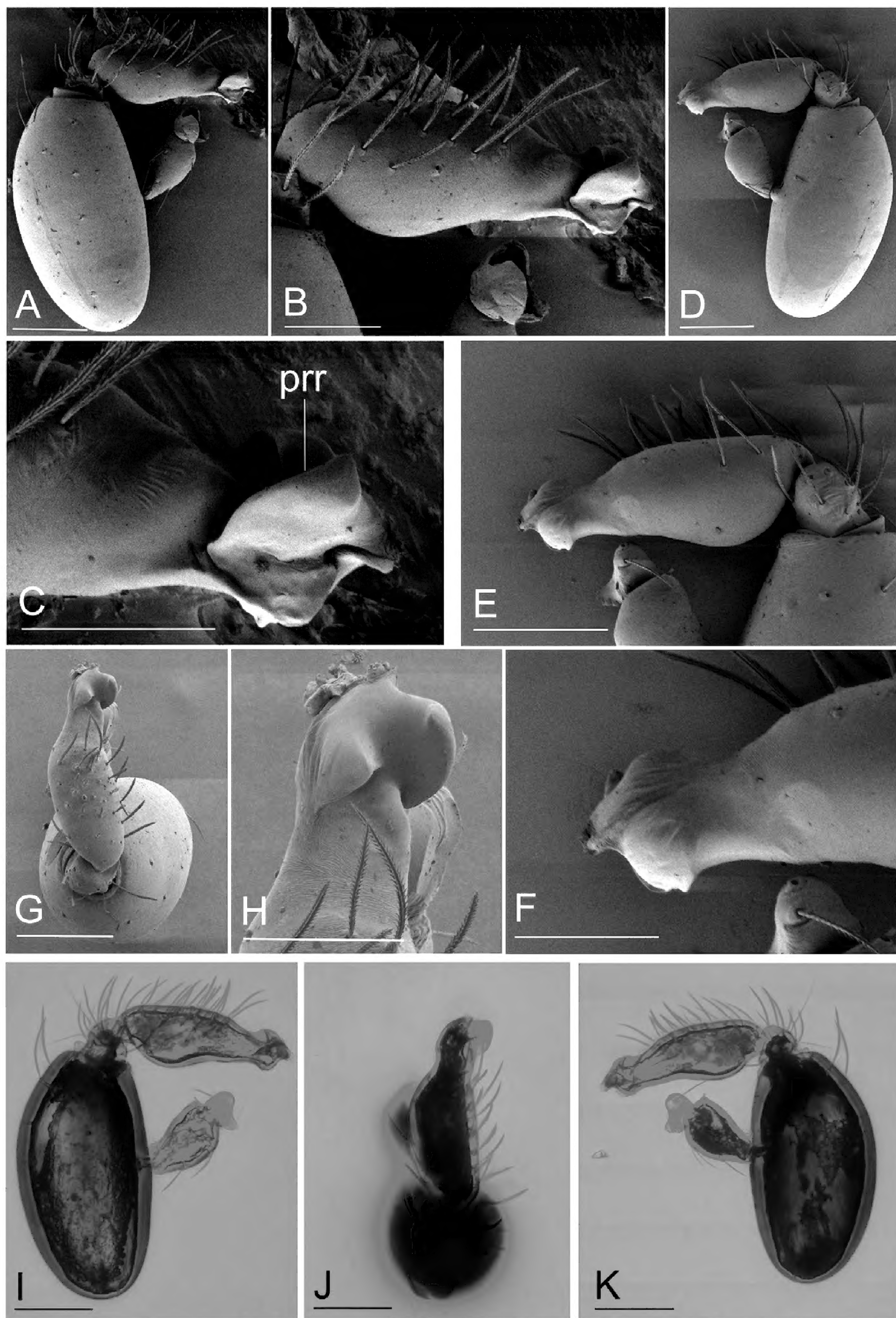


Figure 15. *Opopaea yuhuang* sp. nov., male left palp. **A, I** Prolateral view; **B, E** Cymbiobulbus, prolateral and retrolateral views; **C, F, H** Distal part of cymbiobulbus, prolateral, retrolateral and dorsal views; **D, K** Retrolateral view; **G, J** Dorsal view. Abbreviation: pr = prolateral ridge. Scale bars: 0.1 mm (**A, B, D, E, G, I–K**); 0.05 mm (**C, F, H**).

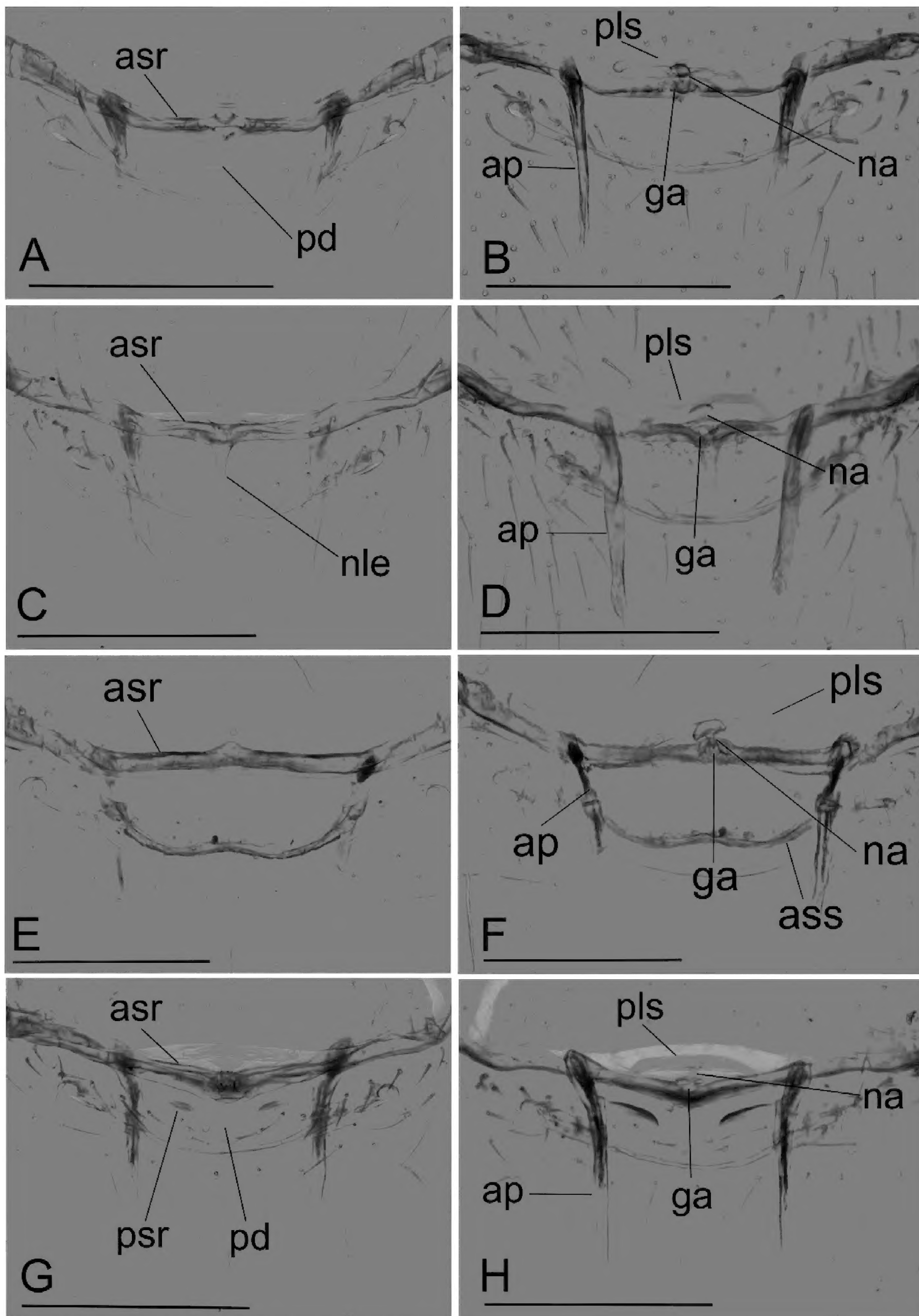


Figure 16. Female copulatory organ. **A, B** *Opopaea mangun* sp. nov.; **C, D** *Opopaea taibao* sp. nov.; **E, F** *Opopaea wenshan* sp. nov.; **G, H** *Opopaea yuhuang* sp. nov.; **A, C, E, G** Ventral view; **B, D, F, H** Dorsal view. Abbreviations: ap = apodeme; asr = anterior scutal ridge; ass = arch-shaped sclerite; ga = globular appendix; na = nail-like process; nle = needle-like extension; pd = postgynal depression; pls = paddle-like sclerite; psr = posterior scutal ridge. Scale bars: 0.2 mm.

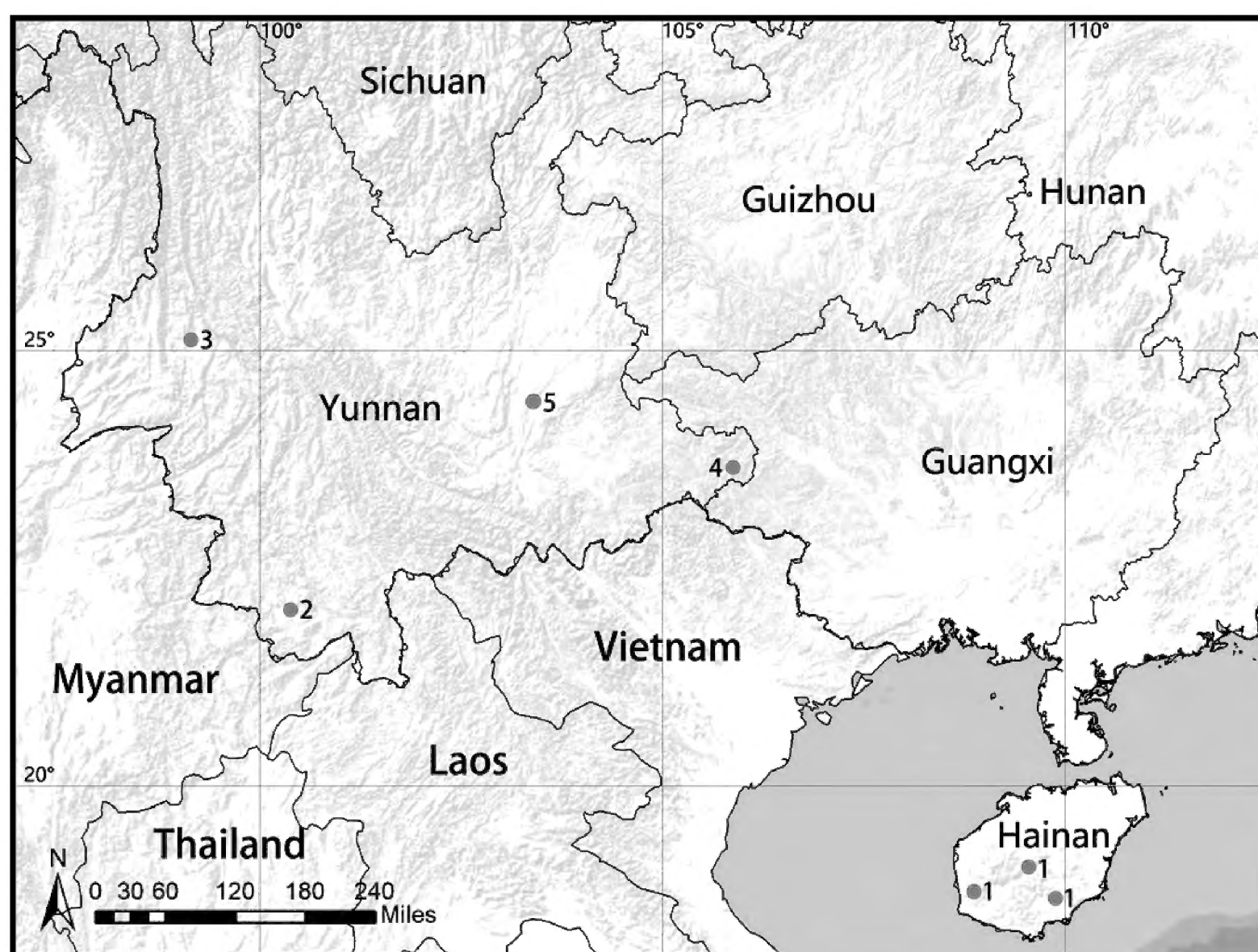


Figure 17. Distribution records of four new species and one newly-recorded species from southern China. 1. *Opopaea foveolata* Roewer, 1963; 2. *Opopaea mangun* sp. nov.; 3. *Opopaea taibao* sp. nov.; 4. *Opopaea wenshan* sp. nov.; 5. *Opopaea yuhuang* sp. nov.

to-pedicel region and the triangular postgynal depression, but can be distinguished by the interrupted posterior scutal ridge (Fig. 14H) vs. not interrupted (Suzuki et al. 2023: fig. 5O) and the broad tip of palpal bulb (Fig. 15A, I) vs. gradually narrowed tip (Suzuki et al. 2023: fig. 5K).

Description. Male (holotype). Measurements: TL: 1.65; CL: 0.69; CW: 0.55; AL: 1.02; AW: 0.64; ALE: 0.08; PME: 0.07; PLE: 0.07; EGW: 0.22; ALE-ALE: 0.03; ALE-PLE: 0.01; PME-PME: 0; PLE-PME: 0; CBL: 0.21; CBW: 0.08; PTL: 0.31; FI: 0.18; FML: 0.09. Colouration: yellow, abdominal interscutal areas creamy-white, booklung covers brown, pedipalps reddish-brown. Habitus as in Fig. 13A, C, E. Carapace (Fig. 13B, F): oval in dorsal view; sides with longitudinal streaks; median area smooth with rows of setae at lateral edges. Eyes (Fig. 13B, G): ALE largest, PLE smallest; posterior eye row recurved viewed from above, procurved from front; ALE separated by less than their radius, ALE-PLE separated by less than ALE radius, PME touching throughout most of their length, PLE-PME separated by less than PME radius. Clypeus height about 1.0 times ALE diameter (Fig. 13G). Sternum (Fig. 13D) longer than wide, fused to carapace; surface smooth; radial furrows present between coxae I-II, II-III and III-IV, with rows of small pits; endites anteriorly with a small, sharply-pointed projection. Abdomen: booklung covers large, ovoid, without setae. Pedicel tube short, ribbed, with small, dor-

solateral triangular extensions, scuto-pedicel region lower than pedicel diameter, with arched scutal ridges, interrupted medially, with straight upper scutal ridge (Fig. 13H). Palp (Fig. 15A–K): femur small, about 1/4 length of patella and medially attached to patella; patella strongly enlarged, elongate oval; tibia small, rounded; cymbiobulbus shorter than the patella; bulb ventrally strongly bulging, tip broad, with a large prolateral folded ridge (prf).

Female. As in male, except as noted. Measurements: TL: 1.84; CL: 0.68; CW: 0.56; AL: 1.21; AW: 0.74; ALE: 0.07; PME: 0.06; PLE: 0.06; EGW: 0.21; ALE-ALE: 0.04; ALE-PLE: 0.01; PME-PME: 0; PLE-PME: 0. Habitus as in Fig. 14A, C, E. Copulatory organ (Figs 14H, 16G, H): posterior margin of epigastric scutal ridge (asr) smoothly triangular, posterior scutal ridge (psr) adjacent to asr, interrupted medially, postgynal depression (pd) small; dorsally with nail-like process (na) connected to paddle-like sclerite (pls).

Distribution. Known only from the type locality.

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References

- Andriamalala D, Hormiga G (2013) Systematics of the goblin spider genus *Opopaea* (Araneae, Oonopidae) in Madagascar. *Bulletin of the American Museum of Natural History* 380: 1–156. <https://doi.org/10.1206/828.1>
- Baehr BC, Harvey MS, Smith HM, Ott R (2013) The goblin spider genus *Opopaea* in Australia and the Pacific islands (Araneae: Oonopidae). *Memoirs of the Queensland Museum. Nature* 58: 107–338. <https://doi.org/10.17082/j.2204-1478.58.2013.2013-11>
- Brignoli PM (1974) On some Oonopidae from Japan and Formosa (Araneae). *Acta Arachnologica* 25(2): 73–85. <https://doi.org/10.2476/asjaa.25.73>
- Henrard A, Jocqué R (2012) An overview of Afrotropical canopy-dwelling *Orchestina* (Araneae, Oonopidae), with a wealth of remarkable sexual dimorphic characters. *Zootaxa* 3284(1): 1–104. <https://doi.org/10.11646/zootaxa.3284.1.1>
- Lin Y, Wu L, Cai D, Li S, Barrion AT, Heong KL (2023) Review of 43 spider species from Hainan Island, China (Arachnida, Araneae). *Zootaxa* 5351(5): 501–533. <https://doi.org/10.11646/zootaxa.5351.5.1>
- Platnick NI, Dupérré N (2009) The goblin spider genera *Opopaea* and *Epectris* (Araneae, Oonopidae) in the New World. *American Museum Novitates* 3649: 1–43. <https://doi.org/10.1206/664.1>
- Ranasinghe UGSL, Benjamin SP (2018) Three new species of *Aprusia* (Araneae: Oonopidae) from Sri Lanka with a phylogenetic analysis of the genus. *Journal of Natural History* 52(11–12): 713–738. <https://doi.org/10.1080/00222933.2018.1444803>
- Roewer CF (1963) Araneina: Orthognatha. Labidognatha. *Insects of Micronesia* 3(4): 105–132.
- Suzuki Y, Hidaka R, Tatsuta H (2023) Revision of goblin spiders (Araneae: Oonopidae) in the Nansei Islands, southwest Japan, with description of a new species. *Zootaxa* 5323(2): 216–242. <https://doi.org/10.11646/zootaxa.5323.2.3>
- Tong Y (2013) Haplogynae spiders from Hainan, China. Science Press, Beijing, 96 pp. [81 pl.]
- Tong Y, Li S (2010) The goblin spiders of the genus *Opopaea* (Araneae, Oonopidae) in Hainan Island, China. *Zootaxa* 2327(1): 23–43. <https://doi.org/10.11646/zootaxa.2327.1.2>
- Tong Y, Li S (2014) A survey of oonopid spiders in Taiwan with descriptions of three new species. *ZooKeys* 396: 67–86. <https://doi.org/10.3897/zookeys.396.7033>
- Tong Y, Li S (2015) Six new species of the genus *Opopaea* Simon, 1891 from Xishuangbanna Rainforest, southwestern China (Araneae: Oonopidae). *Zootaxa* 3931(1): 41–62. <https://doi.org/10.11646/zootaxa.3931.1.3>
- Tong Y, Chen Z, Li S (2020) Two new species of the genus *Opopaea* (Araneae, Oonopidae) from Myanmar. *ZooKeys* 917: 51–61. <https://doi.org/10.3897/zookeys.917.48924>
- WSC (2024) World Spider Catalog. Version 25.0. Natural History Museum Bern. <http://wsc.nmbe.ch> [Accessed on 17 January 2024]